

WHAT IS CLAIMED IS:

1. A reversed, heat-set elastic fiber.
2. The fiber of Claim 1 comprising a temperature-stable polymer.
- 5 3. The fiber of Claim 2 in which the polymer is a thermoplastic urethane polymer.
4. The fiber of Claim 2 in which the polymer is an olefin polymer.
5. The fiber of Claim 4 in which the polymer is a homogeneously branched ethylene polymer.
6. The fiber of Claim 4 in which the polymer is a homogeneously branched,
10 substantially linear ethylene polymer.
7. The fiber of Claim 4 in which the polymer comprises ethylene and at least one C₃-C₂₀ α -olefin.
8. The fiber of Claim 1 further comprising one or more additional fibers so as to form a blend of fibers.
- 15 9. The blend of Claim 8 in which the at least one reversed, heat-set elastic fiber comprises a temperature-stable polymer.
10. The blend of Claim 9 in which the polymer is a thermoplastic urethane polymer.
11. The blend of Claim 9 in which the polymer is an olefin polymer.
12. The blend of Claim 11 in which the polymer is a homogeneously branched
20 ethylene polymer.
13. The blend of Claim 12 in which the polymer is a homogeneously branched, substantially linear ethylene polymer.
14. A reversed, heat-set yarn, the yarn comprising:
 - A. An elastic fiber comprising a substantially crosslinked, temperature-stable
25 olefin polymer; and
 - B. An inelastic fiber.
15. The yarn of Claim 14 comprising a core and cover configuration.
16. The yarn of Claim 15 in which the elastic fiber comprises the core.
17. The yarn of Claim 16 in which the elastic fiber is a homofil fiber.
- 30 18. The yarn of Claim 16 in which the elastic fiber is a bicomponent fiber.
19. The yarn of Claim 16 in which the elastic fiber is a multicomponent fiber.
20. The yarn of Claim 16 in which the elastic fiber comprises a thermoplastic urethane polymer.

21. The yarn of Claim 16 in which the elastic fiber comprises an ethylene polymer.
22. The yarn of Claim 21 in which the polymer is a homogeneously branched ethylene polymer.
23. The yarn of Claim 22 in which the polymer is a homogeneously branched,
5 substantially linear ethylene polymer.
24. The yarn of Claim 22 in which the inelastic fiber is selected from the group consisting of cotton, wool, jute, silk, PET, PBT and nylon.
25. A reversible, heat-set covered fiber, the covered fiber comprising:
- 10 A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer; and
- B. A cover comprising an inelastic fiber.
26. The covered fiber of Claim 25 in which the elastic fiber is a homofil fiber.
27. The covered fiber of Claim 25 in which the elastic fiber is a bicomponent fiber.
- 15 28. The covered fiber of Claim 25 in which the elastic fiber is a homogeneously branched ethylene polymer.
29. The covered fiber of Claim 25 in which the elastic fiber is a homogeneously branched, substantially linear ethylene polymer.
30. The covered fiber of Claim 29 in which the homogeneously branched,
20 substantially linear ethylene polymer comprises ethylene and at least one C₃-C₂₀ α-olefin.
31. The covered fiber of Claim 25 in which the cover is selected from the group consisting of cotton, wool, jute, silk, PET, PBT and nylon.
32. The covered fiber of Claim 25 in which the elastic fiber of the core is part of a yarn.
- 25 33. A method of making a reversed, heat-set yarn, the yarn comprising:
- A. An elastic fiber comprising a temperature-stable polymer having a melting point; and
- B. An inelastic fiber;
- the method comprising:
- 30 (a) Stretching the elastic fiber by applying a stretching force to the fiber;
- (b) Converting the stretched elastic fiber of (a) into a yarn;
- (c) Winding the yarn of (b) onto a package;

(d) Heating the yarn of (c) to a temperature in excess of a temperature at which at least a portion of the crystallites are molten; and

(e) Cooling the yarn of (d) to a temperature below the temperature of step (d).

34. The method of Claim 33 comprising the additional step (f) of removing the stretching force from the fiber and (g) heating the temperature of the yarn above a temperature at which at least a portion of the crystallites are molten such that the length of the yarn obtained in step (g) is less than the length of the yarn obtained in step (f).

35. A method of making warp beams, the method comprising incorporating a yarn made according to Claim 33.

36. A method of making a reversible, heat-set covered fiber, the covered fiber comprising:

A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer having a crystalline melting point; and

B. A cover comprising an inelastic fiber;

the method comprising:

(a) Stretching the covered fiber by applying a stretching force to the covered fiber;

(b) Heating the stretched covered fiber of (a) to a sufficient temperature for a sufficient period of time such that at least a portion of the crystallites of the olefin polymer are molten;

(c) Cooling the stretched and heated covered fiber of (b) to a temperature below the temperature of step (b) for a period of time sufficient to solidify at least a portion the crystallites which were molten; and

(d) Removing the stretching force from the covered fiber.

37. A fabric comprising a reversible, heat-set covered fiber, the covered fiber comprising:

A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer; and

B. A cover comprising an inelastic fiber.

38. The fabric of claim 37, wherein the heat-set of the covered fiber has been reversed.

39. A heat-set fabric comprising a reversible, heat-set covered fiber, the covered fiber comprising:

- A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer; and
- B. A cover comprising an inelastic fiber.

40. The fabric of Claim 39, wherein the heat-set of the covered fiber has been
5 reversed.

41. A method of dyeing a covered fiber, the covered fiber comprising:

- A. A core comprising an elastic fiber comprising a temperature-stable olefin polymer having a crystalline melting point; and
- B. A cover comprising an inelastic fiber;

10 the method comprising:

- (a) Winding the covered fiber onto a spool; and
- (b) Dyeing the covered fiber while it is on the spool.

42. The method of Claim 41 in which the covered fiber is dyed at a temperature in excess of about 60C.

15 43. A method of weaving a fabric from a reversible, heat-set covered fiber, the covered fiber comprising:

- A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer having a crystalline melting point; and
- B. A cover comprising an inelastic fiber;

20 the method comprising:

- (a) Heat-setting the covered fiber;
- (b) Winding the heat-set, covered fiber onto a package;
- (c) Weaving a fabric from the heat-set covered fiber.

44. The method of Claim 43 wherein the heat-set covered fiber is dyed prior to step

25 (c).

45. The method of Claim 43 further comprising (d) Reversing the heat-set of the covered fiber after the fabric is woven.

46. The method of Claim 43 in which the heat-set covered fiber is woven into the fabric in the weft and/or warp direction.

30 47. A method of knitting a fabric from a dyed, reversible, heat-settable covered fiber, the covered fiber comprising:

- A. A core comprising an elastic fiber comprising a substantially crosslinked, temperature-stable, olefin polymer having a crystalline melting point; and
- B. A cover comprising an inelastic fiber;

the method comprising:

- (a) Heat-setting the covered fiber;
- (b) Winding the heat-set, covered fiber onto a spool;
- (c) Dying the heat-set, covered fiber while it is on the spool;
- 5 (d) Knitting a fabric from the dyed, heat-set covered fiber; and
- (e) Reversing the heat-set of the covered fiber after the fabric is woven.

48. A reversed, heat-set elastic material comprising:

- A. An elastic material comprising a substantially crosslinked, temperature-stable olefin polymer; and
- 10 B. Inelastic material.

49. A stretchable nonwoven fabric comprising:

- A. a web or fabric having a structure of individual fibers or threads which are randomly interlaid, wherein the fibers comprise an elastic fiber comprising a substantially crosslinked, temperature-stable, polymer, and optionally
- 15 B. an inelastic film or nonwoven layer.

50. The fabric of Claim 49 which is reversed heat-set.

51. A method of making a stretchable nonwoven fabric comprising:

- a) forming a reversible heat set elastic web or fabric having a structure of individual polymeric fibers or threads which are randomly interlaid;
 - 20 b) heat-setting the web or fabric by heating it to a temperature at which at least a portion of the polymer crystallites become molten while applying force to stretch the web or fabric;
 - c) laminating the fabric of step b) to an inelastic layer while the fabric of step b) is still in a stretched state from the heat-setting procedure;
 - 25 d) cooling the laminated structure while still in a stretched state;
 - e) reheating the laminated structure to allow the reversibly heat set layer to at least partially contract towards its pre-stretched state.
52. The method of Claim 51 wherein step d) occurs prior to step c).